UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

APR 17 2006

To All Interested Government Agencies and Public Groups:

In accordance with the procedures for the preparation of environmental impact statements (EIS), an environmental review has been performed on the following agency action:

Project Name:	Full-Scale Demonstration of the BioGenesis^{SM} Sediment Washing Technology to Decontaminate Dredged Material from the NY/NJ Harbor with Beneficial Use as a Manufactured Soil Product
Purpose of Project:	The project is intended to demonstrate the full-scale viability of a technology to decontaminate sediment for beneficial use
Project Originator:	U. S. Environmental Protection Agency (EPA) Region 2 Dredged Material Disposal Team, Water Resource Development Act Sediment Decontamination Program
Project Location:	Keasbey area of Woodbridge Township Middlesex County, New Jersey
Project Description:	The project consists of decontaminating approximately 50,000 cubic yards (yd^3) of sediment to produce a manufactured soil product suitable for beneficial use, utilizing the BioGenesis^{SM} Sediment Decontamination Technology.

Our environmental review of this project indicates that no significant adverse environmental impacts will result from the action. Consequently, we have decided that preparation of an environmental impact statement (EIS) on the project is not warranted. This decision is based on a careful review of the project's environmental information in the enclosed environmental assessment (EA) and, as discussed in the EA, the results of a previously completed pilot project. The EA and the supporting documents are available for public review at various local repositories. Additional copies of the EA are available from EPA upon request.

Comments supporting or disagreeing with this Finding of No Significant Impact (FNSI) may be submitted to EPA for consideration. All comments must be received within 30 calendar days of the date of this FNSI. Please address your comments to: John Filippelli, Chief of the Strategic Planning and Multimedia Programs Branch, at the above address. EPA will fully consider all comments received.

Sincerely,

Alan J. Steinberg

Alan J. Steinberg
Regional Administrator

Enclosure

ENVIRONMENTAL ASSESSMENT

of the

Full-Scale Demonstration of BioGenesis[SM] Sediment Washing Technology to Decontaminate Dredged Material from the New York/New Jersey Harbor, with Beneficial Use as a Manufactured Soil Product Keasbey, New Jersey

Prepared by:

U.S. Environmental Protection Agency - Region 2
Division of Environmental Planning and Protection

Strategic Planning and Multi-Media Programs Branch
and
Dredged Material Management Team
USEPA Sediment Decontamination Program

Environmental Assessment of the
Full-Scale Demonstration of the BioGenesis[SM] Sediment Washing Technology
to Decontaminate Dredged Material from the New York/New Jersey Harbor
with Beneficial Use as a Manufactured Soil Product
Keasbey, New Jersey

1. Introduction

This Environmental Assessment (EA) evaluates the full-scale demonstration of the BioGenesis Sediment Washing Technology at the Bayshore Recycling Facility in Keasbey, Woodbridge Township, New Jersey.

The purposes of the demonstration project are to build upon the 700 cubic yard (yd^3) Pilot-Scale demonstration project conducted by BioGenesis Enterprises, Inc., in 1999-2000, and to demonstrate the viability of the technology and beneficial use products at full-scale. During this demonstration project, approximately 46,000 yd^3 of sediment dredged from the New York/New Jersey (NY/NJ) Harbor will be decontaminated to produce a manufactured soil product that is suitable for beneficial use. If the demonstration is successful, it could lead to establishment of a commercial-scale facility with capacity to decontaminate up to 500,000 yd^3/year of sediment from the NY/NJ Harbor.

During the project, environmental sampling of the raw dredged material sediment and decontaminated sediment will be conducted. The data and information gained from the environmental sampling, as well as from operation of the system, will be submitted to the U.S. Environmental Protection Agency Region 2 (EPA) and the New Jersey Department of Environmental Protection (NJDEP) to determine the effectiveness and efficacy of the technology.

2. Purpose and Need

The search for effective solutions for managing dredged material, including sediment handling, processing, decontamination, and beneficial use, is a major focus of federal, state and local governments as well as port users (e.g., the Port Authority of New York and New Jersey). Deepening and maintenance dredging is critical to keep the Port economically viable. The Water Resources Development Act (WRDA) charges the EPA-Region 2 and the U.S. Army Corps of Engineers New York District (USACE) to demonstrate the feasibility of decontaminating estuarine dredged material from the NY/NJ Harbor. Thus, the Sediment Decontamination Demonstration Program was established with the goal of demonstrating the capability of one or more facilities to commercially decontaminate up to 500,000 yd^3 of contaminated dredged material annually with beneficial use of the decontaminated sediments. The WRDA Program emphasizes rapid development of environmentally responsible and cost-effective methods for decontaminating dredged material.

3. Alternatives Analysis

Under the USACE Dredged Material Management Plan (DMMP), sediment decontamination is one component of an overall dredged material strategy for the Port of NY/NJ. In addition to ocean placement of unrestricted (clean) dredged material at the Historic Area Remediation Site (HARS), other alternatives for beneficial use of dredged material are also being aggressively pursued. These other alternatives include upland placement with the addition of Portland cement for stabilization/solidification (S/S) for use in brownfield restoration and commercial development, confined aquatic disposal (CADs) cells such as the Newark Bay Pits, and in mine reclamation. It is hoped under the DMMP that sediment decontamination operating at commercial capacity will eventually be able to process at least one million yd^3 of dredged material from the Port.

The Decontamination Program has progressed through demonstrations of numerous alternative technologies at both the bench-scale and pilot-scale of operation. Under the Program, a total of nine different technologies were demonstrated. This included sediment washing, solvent extraction, thermal desorption, and thermal destruction. These processes are important components of a treatment train for dredged materials handling, decontamination, and beneficial use. The Program is now at the stage of moving up to demonstrations of full/commercial-scale facilities that will have the capacity to process up to 500,000 yd^3/year of sediment. The bench-scale and pilot-scale technology evaluations have resulted in a narrowing of the number of alternatives under consideration based on a variety of factors, including:

a. Technical performance,
b. Demonstration costs,
c. Public-private cost sharing,
d. Beneficial use of treated material and potential markets,
e. Public perception of the technology,
f. Site availability, and
g. Corporate evaluations of the business potential for a long-term self-sustainable venture in dredged material decontamination.

The BioGenesis Sediment Washing Technology is a low temperature technology that can be used to decontaminate sediment particles and create a material (cleaned sand, silt, and clay) that is suitable for use as a base for a manufactured soil product. The results obtained during the bench-scale testing of the BioGenesis Sediment Washing Technology showed reductions of organic compounds by approximately 90% and inorganic compounds by about 70%. Further pilot-scale testing under the WRDA program showed that the technology can decontaminate dredged material from the NY/NJ Harbor to below the concentrations listed in the New Jersey Residential Soil Criteria. (See Table 1)

TABLE 1

RAW SEDIMENT CHARACTERISTICS AND NEW JERSEY RESIDENTIAL SOIL CLEANUP STANDARDS

Selected Chemical Constituent(s)	Typical Range NY/NJ Harbor Federal Navigation Sediment[1]	NJ Residential Soil Cleanup Standards[2]
Dioxins/Furans (pg/g)		
2,3,7,8-TCDD	0 - 529	-
TCDD/TCDF TEQ	61 - 224	-
Total Polychlorinated Biphenyls (mg/kg)	0.05 – 3.32	0.49
Polynuclear Aromatic Hydrocarbons (ug/kg)		
Anthracene	233 – 57,500	10,000,000
Benzo(a)anthracene	151 – 23,400	900
Benzo(a)pyrene	214 – 19,400	660
Chrysene	175 – 23,500	9,000
Fluoranthene	233 – 57,500	2,300,000
Total PAHs	2,000 – 306,000	-
Pesticides (ug/kg)		
4-4'-DDD	0.1 – 2,070	3,000
4-4'-DDE	2 - 250	2,000
Metals (mg/kg)		
Arsenic	4 – 97	20
Cadmium	0.2 – 73	39
Chromium	15 – 245	-
Lead	17 – 580	400
Mercury	0.2 – 13.6	14
Nickel	10 – 870	250
Silver	0.15 – 16	110
Zinc	41 - 625	1,500
Grain Size Distribution		
Sand (>0.0625 mm)	4% - 28%	NA
Silt (0.0039 to 0.0625 mm)	36% - 84%	NA
Clay (<0.0039 mm)	12% - 36%	NA

mm	millimeters	TEQ	toxicity equivalency
mg/kg	milligrams per kilogram	DDD	dichlorodiphenyldichloroethane
ug/kg	micrograms per kilogram	DDE	Dichlorodiphenyldichloroethylene
pg/g	picograms per gram	PAH	polynuclear aromatic hydrocarbons
TCDD	tetrachlorodibenzodioxins	NA	Not applicable
TCDF	tetrachlorodibenzofurnas		

[1] From the "New York and New Jersey Federal Navigation and Private Berthing Sediment Database" personal communication with Mark Reiss, U.S. EPA Region 2, December 1999.

[2] NJDEP, 1999

Based on technical evaluations conducted by EPA, USACE, Brookhaven National Laboratory, and the New Jersey Department of Transportation's Office of Maritime Resources (OMR), the BioGenesis Sediment Washing Technology developed and patented by BioGenesis Enterprises, Inc. was designated to continue forward in the WRDA and OMR Sediment Decontamination Programs, and to be demonstrated at a full-scale level.

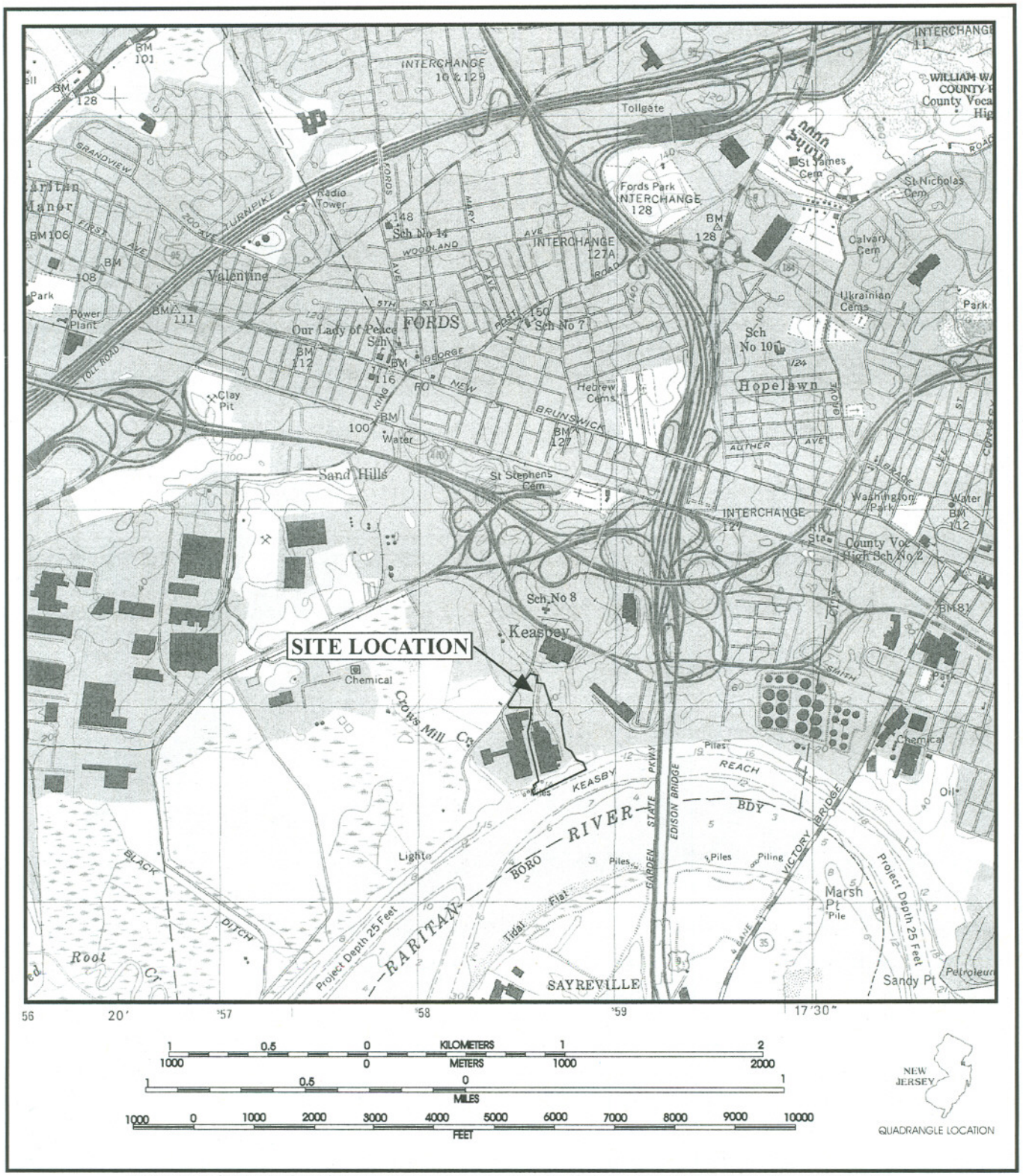
4. Detailed Description of Preferred Alternative

a. Site Description and Project Overview

BioGenesis has leased a portion of an existing privately-owned warehouse facility at the Bayshore Recycling Corp. (Bayshore) facility. It is located at 75 Crows Mill Road, Keasbey, New Jersey, in Woodbridge Township, along the Raritan River (Figure 1). Currently, operations at the Bayshore facility include the operation of a NJDEP-licensed Class-B Recycling Facility. This recycling facility processes construction and demolition debris such as concrete, asphalt, brick, block, and slag, and recycles it into marketable commodities such as clean stone, road stone, fill material and various custom-blended products. There is frequent vehicular activity at the site, with approximately 100 trucks entering or leaving the site on an average workday, and regular roadway wetting and/or sweeping for dust control. Future plans for that facility could include acceptance and recycling of additional materials such as tires, sediment, etc.

Bayshore has installed a Temporary Dredge Material Storage and Handling Facility at the site along the shoreline of the Raritan River, for use in connection with the BioGenesis demonstration project, as well for other sediment decontamination demonstration projects. The Temporary Dredged Material Storage and Handling Facility are contained within a bulk carrier ship moored along the shoreline by a system of anchored barges.

The location of the facilities for the decontamination demonstration project is shown in Figure 2. The site has asphalt roads for truck access to deliver supplies and chemicals, pick up debris from the screening facility, pick up roll-off containers of sludge from the wastewater treatment plant, and transport the treated material for reuse off the site. The BioGenesis Sediment Washing Process occurs in an existing warehouse at the southern end of the facility, and is expected to operate 24 hours a day/5 days a week. Dredged material arrives by dredge scow and is offloaded into designated holds of the ship using a clamshell bucket/crane apparatus attached to the ship. The material is screened and stored in the ship for processing in the BioGenesis facility. All oversized debris is placed in roll-off bins and disposed of at an appropriate off-site landfill or recycling facility.



Source: United States Geological Service, Perth Amboy, New Jersey Quadrangle Map, 7.5-Minute Series (Topographic), 1995

Figure 1 - Site Location

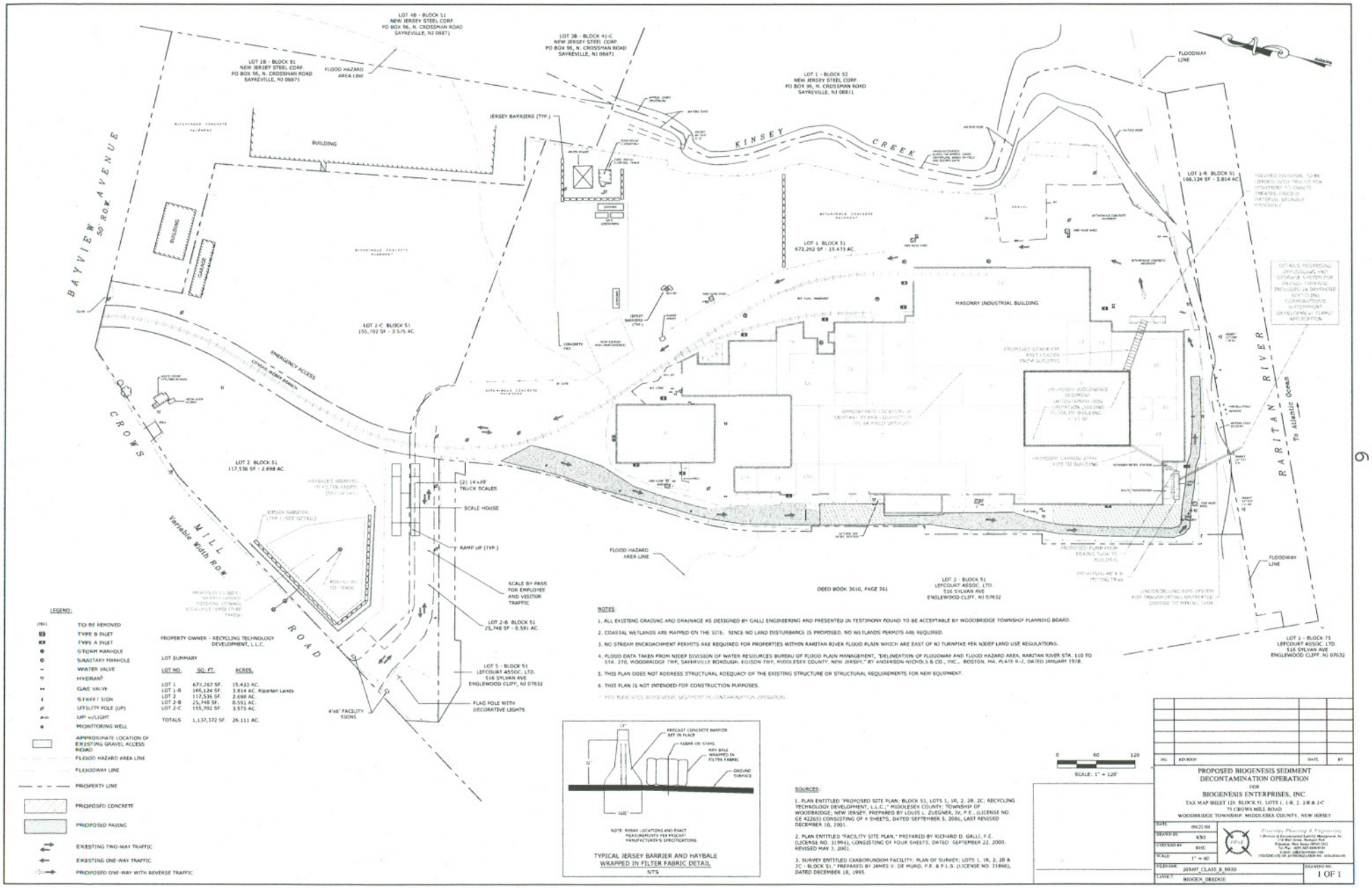


FIGURE 2 --- BIOGENESIS AT KEASBEY, NJ SITE PLAN

Screened sediment is pumped from the ship to a front-end sediment storage tank, where it is pumped into the processing building.

After treatment by the BioGenesis Sediment Washing Process, sediment is stored outside in the Treated Sediment Storage Area, also shown on Figure 2. From this storage location, clean sediment is loaded into trucks for transport to an off-site facility for blending into a manufactured soil product. Wastewater from the decontamination process is treated in an onsite pretreatment plant located within the processing building. Some treated wastewater is reused onsite as process water; excess treated wastewater is discharged to the local publicly owned treatment works owned by the Middlesex County Utilities Authority (MCUA).

b. *Process Description*

The BioGenesis Sediment Decontamination Technology involves four main unit processes: Preprocessing, Aeration, Application of Collision Impact Forces, and Cavitation/Oxidation. An overview of the general BioGenesis Sediment Washing Process is shown in Figure 3. The process flow diagrams for the sediment decontamination demonstration project are shown in Figure 4.

Screened and diluted raw sediment is pumped to the treatment facility from the front-end storage and pumped to the preprocessor mix tank where slurry is mixed with proprietary, specialty chemicals such as surfactants, chelating agents, and defamer. The specialty chemicals are added at this stage, to prepare the sediment for decontamination by decreasing the affinity among contaminants, sediment solids, and naturally occurring biomass. The sediment is then pumped to the preprocessor unit where physical action from high-pressure water jets dis-aggregates sediment particles from each other and separates loosely-associated material from the biomass-coated particles. The result is that clumped particles are dis-aggregated and suspended in the aqueous phase. Additionally, the biomass is fractionated and transferred to the aqueous phase.

Aeration can then be used to remove floatable organic material liberated from the sediment during Step One and suspended in the aqueous phase. If, as anticipated, significant quantities of floatable organic material are not present in the sediment, the aeration step may not be necessary. Based on the general information regarding the sediment in the NY/NJ Harbor, floatable organics are not expected to be significant enough to warrant this process step and consequently, an aeration unit is not expected to be necessary for this project.

Collision impact forces are then applied to the isolated particles in the collision chamber, to strip the biofilm layer from the solid particles and transfer it into the aqueous phase, away from the sediment particle surfaces. As a result of this step, contamination that had been sorbed to the individual solid particles and the biomass are transferred to the aqueous phase.

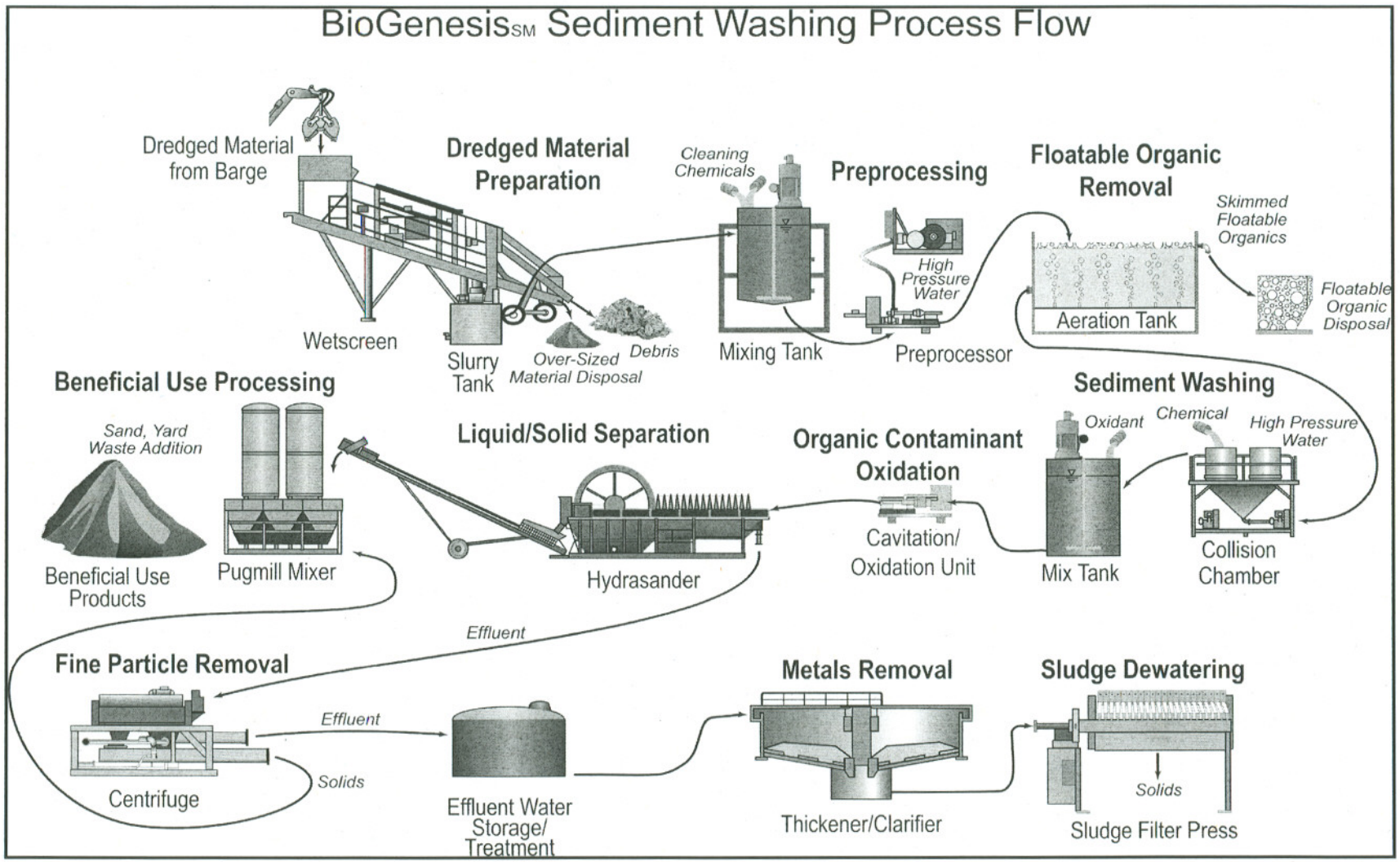


Figure 3 - BioGenesis Sediment Washing Process

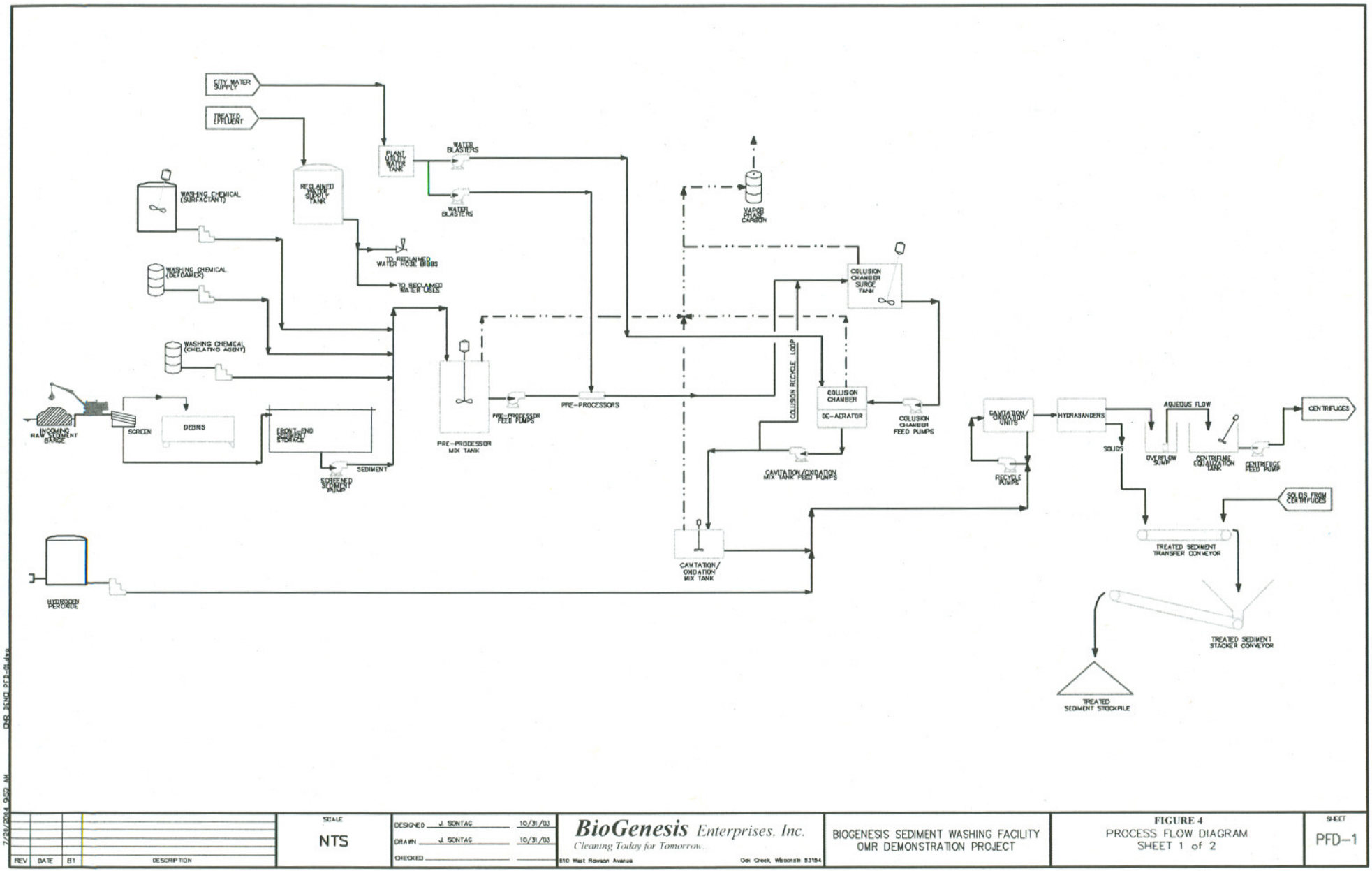
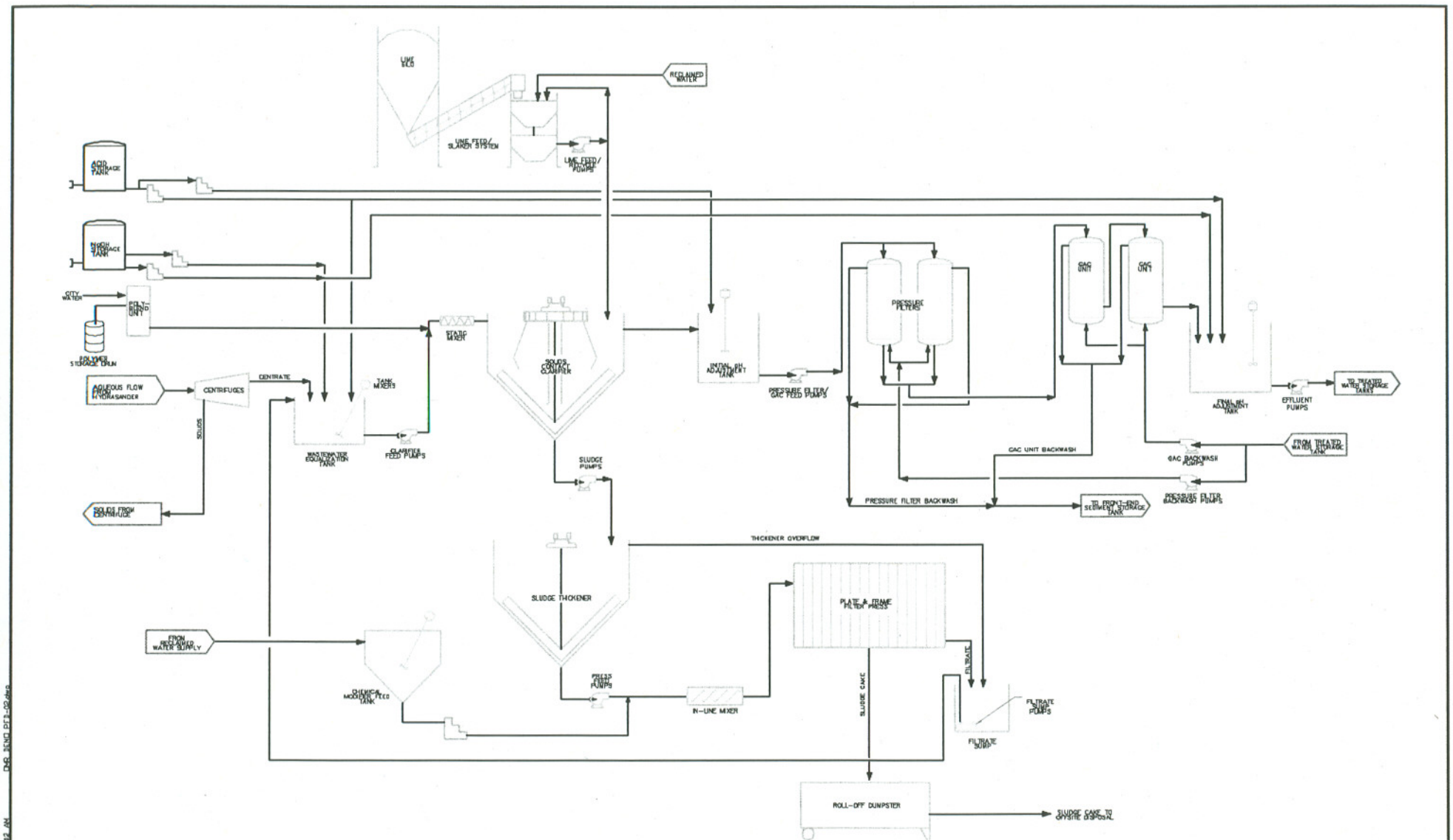


FIGURE 4 sheet 1 of 2



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BioGenesis *Enterprises, Inc.*
Cleaning Today for Tomorrow...
810 West Rawson Avenue, Oak Creek, Wisconsin 53154

BIOGENESIS SEDIMENT WASHING FACILITY
OMR DEMONSTRATION PROJECT

FIGURE 4
PROCESS FLOW DIAGRAM
SHEET 2 of 2

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FIGURE 4 sheet 2 of 2

Then, the organic contaminants and biomass segregated from the sediment particles are destroyed using cavitation and oxidation. Hydrogen peroxide, a strong oxidizing agent, is added to the sediment slurry upstream of the cavitation system. Cavitation occurs when air bubbles created in the slurry implode. The implosion causes instantaneous high pressure and temperature, which in the presence of a strong oxidizing agent, causes organic molecules to break down into carbon dioxide and water. At the conclusion of this step, the slurry consists of inorganic sediment particles that have been washed off contaminants, suspended organic biomass containing residual organic and inorganic contaminants, and water that contains the majority of contaminants (which are expected to be primarily inorganic materials) that have been desorbed from the sediment particles and biomass.

Following the above decontamination steps, the slurry is immediately processed through solid/liquid separation units to segregate the decontaminated solids fraction from the liquid fraction containing the inorganic contaminants and the residual organic contaminants. The solid/liquid separation systems may include a primary settling device such as a "Hydrasander," followed by a centrifuge. The cleaned sediment solids separated from the aqueous phase are then stockpiled for transport to the off-site beneficial use preparation facility. The aqueous phase containing the inorganic and organic contaminants is processed through an onsite wastewater pretreatment system. Part of the treated water may be reused within the decontamination process, but the majority of the pretreated wastewater needs to be discharged to the local sewer system.

c. *Sediment Sources*

Under the demonstration project, OMR is responsible for identifying and arranging for delivery of sediment to be decontaminated. OMR has identified the following three potential sources for the sediment quantities needed for the BioGenesis Sediment Washing Process demonstration project:

i. 21,000 yd^3 from the berthing area at Darling International, Inc. facility at 825 Wilson Avenue, Newark, Essex County, New Jersey, in upper Newark Bay.

ii. Up to 20,000 yd^3 from the berthing area at the Amerada Hess's Newark Delancey Terminal facility at 1111 Delancey Street, Newark, Essex County, New Jersey, in upper Newark Bay.

iii. Up to 5,000 yd^3 from the lower Passaic River as part of the EPA/OMR/USACE Passaic River Restoration Study Dredging and Sediment Decontamination Treatability Pilot Study.

The NJDEP regulates the disposition of sediment dredged from the NY/NJ Harbor through the issuance of dredging permits. Thus, the dredging contractors or site owners are required to obtain NJDEP approval for the disposition of dredged material at the BioGenesis Facility.

Facility Design Basis -The BioGenesis facility has been designed to be capable of processing 40 yd^3 of dredged material per hour (250,000 yd^3/year). The basis for the design is to decontaminate sediments similar to those shown previously in Table 1 as "Typical Range NY/NJ Harbor Federal Navigation Sediment" down to concentrations of contaminants that meet the New Jersey Residential Soil Cleanup Standards.

d. Demonstration Project Operations

Material Handling

Barge Unloading: Sediment is unloaded from barges using a backhoe with a clamshell bucket. The backhoe will drop sediment directly into a hopper on the screening unit. Oversized debris is segregated and placed into roll-off containers for transport to an approved offsite disposal or recycling facility.

Screening Facility: Sediment from the delivery barge is screened to remove solids greater than 1/4-inch in size. The screening equipment is a mobile package unit placed on the Temporary Dredge Material Storage and Handling Facility (ore carrier ship). Solids from the screening operations are also directed into roll-off containers for transport to an offsite disposal or recycling facility.

Sediment Storage Tanks and Feed System: The screened sediment drops through the screen into the ship's holds below for storage. The screened sediment is slurried in the holds of the ship prior to being pumped to the treatment facility. A submersible dredge pump is used to transfer the screened, slurried sediment from the ship's holds to the mixing tank. After mixing, it is conveyed to the process treatment building.

Sediment Decontamination Process

Mixing Tank: An 18,000 gallon mixing tank has been placed outside along the waterfront to accept screened, slurried sediment from the holds of the ore carrier. The tank is equipped with a level controller which is used to control flow from the ship to the process. A constant-speed pump is used to transfer the slurry from this tank to the pre-processor mix tank.

Pre-processor Mix Tank: This tank, located inside the building, receives the screened sediment slurry from the mixing tank and provides mixing with chemicals to aid the process of solubilizing contaminants from the sediment surface into the aqueous phase. The tank has a level sensor to provide an operating range for the tank mixer motor(s) and high/low level shutoffs and alarms.

Pre-processor: The preprocessor is equipped with a constant speed feed pump and two in-line preprocessor units. The preprocessor unit is a proprietary BioGenesis process unit which utilizes high pressure water jets to dis-aggregate sediment particles from each other and separate loosely-associated material from the biomass-coated particles. 10,000 pound-per-square inch (psi) water jets pump material from the preprocessor mix tank into the preprocessor unit at the rate of 60 gallons per minute (gpm). A recycle loop is included so that a constant-speed pump can operate continuously by recycling the slurry back to the preprocessor mix tank, eliminating the possibility of line plugging. The recycle loop and the main process line will each have pinch valves. A reclaimed water supply line is connected to the recycle loop so that this pipe can be flushed automatically.

Water Blaster Units: These units generate high-pressure water jets used in the preprocessor and the collision chamber. Each water blaster unit is capable of producing 30 gpm water jets at 10,000 psi. Two sets of two water blaster units are provided. One set serves the preprocessor; one serves the collision chamber.

Collision Chamber Surge Tank: This tank receives slurry directly from the preprocessor unit. This tank provides the surge capacity prior to the collision chamber to allow for continuous processing. The tank has a level sensor/transmitter to provide an operating range control signal for the tank mixer, and high/low level shutoffs and alarms.

Collision Chamber: The collision chamber is a proprietary BioGenesis process unit in which high-pressure water jets exert collision impact forces on the isolated sediment particles to strip the biofilm layer from the solid particles and transfer it into the liquid phase and away from the sediment particle surfaces. Water jets at 10,000 psi are pumped into the collision chamber at the rate of 60 gpm. Operation of the water blasters is as discussed above. Two constant-speed pumps are included on the Collision Chamber Skid, one to feed the collision chamber and one to discharge the treated sediment to the cavitation/oxidation mix tank.

Cavitation/Oxidation Mix Tank: This tank receives slurry from the collision chamber and provides surge capacity prior to the cavitation/oxidation unit. The tank has a level sensor/transmitter to provide an operating-range control signal for the tank mixer motors and an alarm at higher than desirable operating levels.

Hydrogen Peroxide Feed System: Hydrogen peroxide is added prior to the cavitation/oxidation unit to assist in the oxidation of the organic contaminants present in the sediment slurry. The tank has a level sensor/transmitter with local level indication.

Cavitation/Oxidation Unit: The unit consists of a recycle pump and an in-line cavitation/oxidation chamber. In this unit, air bubbles created in the slurry implode, causing instantaneous high pressure and temperature which, with the aid of hydrogen peroxide, break down organic molecules into carbon dioxide and water. The suction line of the recycle pump pulls slurry from the cavitation/oxidation mix tank. The pump is sized to recycle the slurry at about 500 gpm through the cavitation/oxidation chamber. A pneumatic pinch valve is provided on the discharge line to control the flow out of the unit.

Hydrasander: Flow from the cavitation/oxidation unit discharges into a hydrasander for preliminary settling of solids. The unit is equipped with controls for engaging and disengaging the bucket wheel and spiral conveyor, and adjusting their speed. Solids from the unit are discharged onto a conveyor for truck transport to the treated-sediment storage area.

Overflow Sump and Transfer Pump: Liquid effluent from the Hydrasander flows over an integral weir and discharges into the overflow sump. The sump has a level sensor/transmitter for pump control and high/low shutoffs and alarms. The liquid is transferred from the sump to the centrifuge equalization tank using a submersible pump.

Centrifuge Equalization Tank: This tank equalizes the liquid prior to the centrifuge.

Centrifuge Feed Pump: Liquid is pumped to the centrifuges using a constant-speed centrifugal pump.

Centrifuges: Two continuous feed centrifuges achieve further solids/liquid separation. The centrate from the centrifuges drains by gravity to the wastewater equalization tank. Solids from the centrifuge are discharged onto a conveyor and transported via truck to the treated sediment storage area.

Wastewater Treatment Process

Wastewater Equalization Tank: Centrate from the centrifuges flows by gravity into the wastewater equalization tank. The tank is equipped with a pH sensor/transmitter for control of the acid and caustic feed systems.

Clarifier Feed Pump: Wastewater is pumped from the equalization tank to a solids contact clarifier for removal of inorganics. The clarifier feed pump is a constant-speed pump.

Solids Contact Clarifier/Thickener: A solids contact clarifier (SCC) unit precipitates and thickens inorganic solids and clay. The SCC has a side-feed port for receiving the influent and sampling ports along the tank sidewall for sampling within the draft tube, reaction zone and along the sidewall. A separate side-feed pipe is used to receive lime slurry from the lime feed system. Lime is used to increase the pH of the influent wastewater to precipitate soluble heavy metals at an adjustable pH from 9.5 to 10.0. A Polyblend polymer feed system is used to add polymer to the influent wastewater line upstream of an in-line static mixer upstream of the SCC. The SCC includes a turbine drive for mixing in the influent zone. A rake mechanism enhances sludge thickening and removal.

Clarifier Sludge Pump: Sludge from the SCC consists of lime, inorganic sediment and clay. Concentrated sludge (about 3 to 5 percent solids by weight) is discharged at the bottom of the SCC unit. A recessed-impeller type pump is provided for transfer of the sludge. The SCC sludge pumps discharge to the sludge thickener for sludge storage and additional thickening.

Lime Feed System: The lime slaking system is designed to receive granular quicklime via pneumatic trucks and store the quicklime in a storage silo. The system discharges dry quicklime to the lime slaker, at a controlled rate, via a lime feeder screws. The slaker controls the reaction of quicklime with reclaimed water in order to provide a hydrated lime slurry at a concentration between 6 and 10 percent solids. The slurry aging tank receives the slaked lime via gravity flow, and a pressure transducer monitors the tank contents and provides a continuous level signal. The aged lime slurry is subsequently pumped to the SCC via the lime feed/recycle centrifugal pumps (recessed-impeller type). This increases the process pH to approximately 9.5 (adjustable set point) to precipitate soluble heavy metals.

Initial pH Adjustment Tank: Clarified effluent from the SCC is collected in radial launders and flows by gravity to the initial pH adjustment tank. This tank serves to decrease the pH by approximately 0.5 to 1.0 pH unit to prevent post-precipitation within the pressure filter/granular activated carbon (GAC) units.

Pressure Filter/GAC Feed Pump: The effluent from the initial pH adjustment tank is pumped to the pressure filter/GAC unit using a variable-speed centrifugal pump.

Pressure Filter: A pressure filter is used to remove particulates to less than 1.0 nephelometric turbidity unit (NTU). The pressure filter is equipped with a

magnetic flow meter with a 4-20 mA output which modulates the variable frequency drives on the feed pump and results in a steady flow rate through the pressure filtration/GAC system.

Pressure Filter Backwash System: The pressure filter backwashes based upon a preset differential pressure through the unit. When the differential pressure is such that a pressure filter backwash is required, the influent and effluent valves of the standby pressure filter open and the influent and effluent valves for the on-line pressure filter close. After a 2-second lag, the pressure filter backwash pump backwashes the pressure filter for 4 minutes.

GAC Contactors: The GAC units consists of two 10-foot diameter tanks operated in series to remove dissolved organics. Flow through the GAC units is controlled by the flow through the pressure filter, which is controlled by the pressure filter/GAC feed pump technique previously described. The effluent from the GAC units has enough pressure to discharge into the final pH adjustment tank.

GAC Backwash System: The need for backwashing either of the GAC units depends upon the differential pressure through each tank. The backwash pumps are started manually and the backwash control valve to the lead GAC unit is slowly opened manually for 10 to 15 minutes.

Final pH Adjustment Tank: Effluent from the GAC units will flow into the final pH adjustment tank. A pH sensor/transmitter will measure the pH of this mixed tank. This information is used to control the addition of caustic or acid to the tank in order to maintain the pH at the user-defined set point (adjustable from pH 7 to pH 9).

Effluent Pumps: Effluent from a final pH adjustment tank is pumped to the treated effluent storage tank using a centrifugal effluent pump.

Treated Water Storage Tank: Treated water from the process is stored in a treated-water storage tank prior to reuse or discharge to the sanitary sewer.

Sludge Thickener: Sludge from the SCC is transferred to the sludge thickener as described previously. The thickener is equipped with a rake mechanism drive. Overflow from the sludge thickener is discharged (gravity flow) to the filtrate sump. Thickened sludge (about 8 to 10 percent solids) is pumped to a plate and frame filter press for dewatering.

Filter Press Feed Pump: Thickened sludge, consisting of lime, inorganic sediment and clay, is discharged from the bottom of the thickener through the thickener sludge pump to the filter press.

Plate and Frame Filter Press: Sludge is dewatered to about 25 to 40 percent solids using a plate and frame filter press. The unit is equipped with control panel which controls the entire operation of the filter press. The panel controls the sequence of the dewatering process and the support systems, which include the feed pumps, the chemical modifier (i.e., body feed and precoat) feed system and the air supply to the press. The dewatered filter cake drops into a roll-off container for subsequent shipment to an offsite disposal facility. Filtrate is discharged to the filtrate sump.

Chemical Modifier Feed System: This system is used to add diatomaceous earth or a similar chemical, if needed, to improve performance of the filter press.

Filtrate Sump and Pump: Filtrate from the press and overflow from the sludge thickener drains to the filtrate sump. The sump is equipped with a submersible pump to transfer the water to the wastewater equalization tank.

e. *Fate of Contaminants*

Sediments dredged from estuarine environments can contain a variety of organic and inorganic contaminants including polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, and chlorinated dioxins and furans, and metals. Presented in Table 1 are typical concentration ranges for organic and inorganic contaminants in NY/NJ Harbor sediment. The BioGenesis Sediment Washing Process is expected to decontaminate the dredge material below the New Jersey Residential Soil Cleanup Criteria (NJRSCC) concentrations listed in Table 1.

Organic Contaminants: In the BioGenesis Sediment Washing Process, organic contaminants are removed from the sediment particles during the preprocessing and collision chamber steps. The cleaned sediment particles are then removed from the slurry using liquid/solid separation techniques. Organic contaminants are oxidized (destroyed) in the Cavitation/Oxidation step. Organic contaminants which are not completely oxidized in the Cavitation/Oxidation Step are recovered in the waste sludge. The treated sediment is sampled to confirm that the concentration of organic contaminants is below the NJRSCC. If it does not pass these criteria, the sediment is re-washed.

Inorganic Contaminants: In the BioGenesis Sediment Washing Process, inorganic contaminants are physically removed from the sediment particles during the preprocessing and collision chamber steps. The cleaned sediment particles are then removed from the slurry using liquid/solid separation techniques. Inorganic contaminants are then recovered in the waste sludge using conventional wastewater techniques. The treated sediment is sampled to confirm that the concentration of inorganic contaminants are below the NJRSCC. If it does not pass these criteria, the sediment is re-washed.

f. Usable Products from the BioGenesis Sediment Washing Facility

The decontaminated sediment from the BioGenesis Sediment Washing Process can be used as a raw material (amendment) for a variety of beneficial use products. In general, there are two main categories of beneficial use products for decontaminated sediment: Residential Use Products and Non-Residential Use Products. These categories are differentiated by the level of decontamination achieved by the BioGenesis Sediment Washing Process.

For the demonstration project, BioGenesis is planning to decontaminate the sediment for use as a raw material for a Residential Use Product. The sediment is decontaminated to pass the NJRSCC, and upon receipt of analytical results, would be sold as a raw material. Potential users include tree farms, arborists, lawn care experts, mulch suppliers and woodcutters, which can incorporate decontaminated sediment that meets the NJRSCC into a manufactured soil/fill product by blending it with other additives (organic matter, sand, etc) to achieve the needed physical characteristics.

g. Management of Residuals

BioGenesis will properly dispose of all residual waste generated during the demonstration project. Anticipated residuals include oversized debris from the screening facility, wastewater, wastewater treatment sludge, spent activated carbon, activated carbon from an emissions control system, personnel protective equipment, and miscellaneous trash and solid wastes.

Residuals will be managed as follows:

Oversized Debris: Oversized debris from the screening operations is stored in roll-off containers and transported to a NJDEP-licensed recycling facility or a NJDEP-licensed solid-waste landfill for disposal.

Wastewater: Wastewater is discharged to the Middlesex County Utility Authority (MCUA), the local publicly owned treatment works. BioGenesis is in the process of obtaining permits from MCUA for a temporary discharge for the demonstration project.

Wastewater Pretreatment Sludge: Sludge from the wastewater pretreatment plant is sampled and analyzed to determine whether or not it is a characteristic hazardous waste. Based on the results, it is transported and disposed of at a NJDEP-licensed industrial waste landfill (Subtitle D) or a RCRA permitted hazardous waste landfill (Subtitle C). If the wastewater pretreatment sludge needs to be pretreated prior to disposal (to meet land ban restrictions), then this will be performed by the disposal facility.

Spent Activated Carbon: Spent activated carbon will either be incinerated or returned to the supplier (at a cost) for regeneration.

PPE and Miscellaneous Trash: PPE and miscellaneous trash is disposed of off-site as municipal solid wastes.

Material Not Meeting NJRSCC: Sediment product that resists treatment to meet the NJRSCC is placed at an upland site permitted to take dredged material or in a suitable permitted landfill. This may require modification of existing dredging permits.

Any wastes removed from the site as hazardous wastes are properly manifested, and proper documentation regarding the type and quantities of all wastes shipped off-site is maintained.

5. Affected Environment

a. Project Area, Surrounding Area

The BioGenesis Sediment Washing Process decontamination facility is located within an existing warehouse facility at the Bayshore facility in the Woodbridge Township, New Jersey. The site is located at 75 Crows Mill Road, Keasbey, New Jersey 08832, along the Raritan River.

Currently, operations at the Bayshore facility include the operation of a NJDEP-licensed Class-B Recycling Facility. This recycling facility takes construction and demolition debris such as concrete, asphalt, brick, block, and slag, and recycles it into marketable commodities such as clean stone, road stone, fill material and various custom-blended products.

The site is located in an industrial area of Keasbey, along the Raritan River near the intersection of Route 9 with the Raritan River. The site is bounded by Kinsey Creek/New Jersey Steel Corp. on the west and Lefcourt Assoc. LTD. on the east. The site is also bounded by Crows Mill Road on the north and the Raritan River on the south.

The site is essentially flat with a gentle slope towards the Raritan River. Although there are several existing underground utilities on the site, including a city water line, a fire water line, and a storm sewer, there are no residential areas adjacent to or in close proximity to the project site.

b. Land Use/Zoning

The Bayshore site is zoned for industrial use.

c. Wetlands

There are no federal or state designated wetlands present on the site. Wetland restoration on a neighboring property is ongoing under NJDEP oversight.

d. Water Quality

The site is adjacent to the Raritan River and Kinsey Creek, but there are no surface water bodies located on the site. Groundwater monitoring activities are ongoing on the site as part of sitewide remediation under the oversight of NJDEP Industrial Site Recovery Act (ISRA) Program. There was a water production well on the property that was properly abandoned. The area is serviced by public water supply.

e. Air Quality

Middlesex County, NJ has been designated non-attainment for both ozone and PM2.5 (particulate matter with sizes up to and including 2.5 microns in diameter). It is in an attainment zone for all other criteria pollutants.

f. Noise

Sounds at the Bayshore site result from the operations onsite and in the surrounding area. Currently, these are truck and automobile traffic, and heavy machinery (front-end loaders, crushers, and other earth-moving equipment). These sounds are typical at sites zoned for heavy industry.

g. Socio-Economics

The site is located in an area that is zoned for industrial uses. EPA Region 2's Environmental Justice tool indicates that the site and its immediate environs are not considered an "Environmental Justice" area. Consequently, environmental justice is not a factor requiring further evaluation.

h. Endangered Species

Consultation with the U.S. Fish and Wildlife Service indicates that no endangered or threatened species or their habitat are known to be present on the site.

i. Floodplains

A portion of the site lies within the flood hazard area associated with the Raritan River.

6. Environmental Consequences

a. Land Use/Zoning

There will be no change in land use or zoning at the site as a result of the BioGenesis demonstration project. Most of the overall site will continue to be used for Bayshore Recycling's existing operations.

b. Wetlands

Although there are wetlands adjacent to the site, there are no wetlands on the site. Because the project's operations will occur on the site, and within existing structures, the project will not affect any state or federal jurisdictional wetlands.

c. Water Quality

Although the site is adjacent to the Raritan River and Kinsey Creek, the project will not affect either of these water bodies. Sediment will be transported to the decontamination equipment via a slurry pipeline in accordance with the requirements and conditions of the requisite permits from the U.S. Army Corps of Engineers and the NJDEP. The sediment slurry is pumped through a pipeline using pumps located at the bottom of the ship's hold. The pipeline is inspected and monitored frequently. If there is a problem such as a rupture or leakage, the pumps will be shut down until the problem is rectified. The project will utilize public water, and all wastewater is pre-treated at an on-site wastewater treatment facility prior to discharging it to the sanitary sewer system for final treatment at the Middlesex County Utilities Authority's wastewater treatment facility. All treated material is stored on an impervious surface. Thus, the project has no effect on ground water or surface water quality.

d. Air Quality

Except for vehicular emissions from equipment delivery trucks and equipment loading and off-loading contaminated and decontaminated sediments, no air emissions are expected to result from the operation of the demonstration project. Processing will occur in large self-contained tanks. A temporary air permit has been issued for the project by the NJDEP.

e. Noise

Sounds emanating from the BioGenesis demonstration facility are similar to those from any typical materials processing plant. As such, they are expected to be virtually indistinguishable from the sounds of the existing material recycling operations at the site. Furthermore, as the BioGenesis facility is located within an existing warehouse, the operations will not increase the noise level in the surrounding area. The BioGenesis facility will operate 24 hours a day, five days a week. Nevertheless, during the evening hours, or non-normal working times, the only impact to the noise level in the area would be minimal, from truck movements on the site.

f. Socio-Economics/E.O. 12898 Environmental Justice

The project is not expected to have any adverse socioeconomic impacts and, as the project is not located in an Environmental Justice area, it will not have any disproportionate impacts on any low-income or minority groups.

g. Endangered Species

The U.S. Fish and Wildlife Service has been consulted about the project and has indicated that no federally-designated threatened or endangered species or their habitat are known to exist on the site. Accordingly, no endangered/threatened species are expected to be affected by the project.

h. Floodplains

A portion of the site is within the flood hazard area designated by the Federal Emergency Management Agency. However, as the treatment units are located within an existing building, their presence will not alter the flood characteristics of the site or of the river. Furthermore, in the event that the site were to flood, the treatment units would be shut down and any contaminated sediments would stay safely within the ship and/or barges where they are usually stored. Decontaminated/clean dredged material is stockpiled within concrete barriers.

i. Cultural/Historic Resources

The proposed construction and operating impacts are within existing structures and along shoreline areas. A field inspection of the site confirmed that the shoreline area has been subjected to extensive prior disturbance. Furthermore, the project's impacts to existing structures are very limited. Consequently, EPA has determined that the proposed demonstration project has no effect on resources on or eligible for nomination to the National Register of Historic Places.

j. Cumulative Effects

Implementation of the project would not result in any significant adverse cumulative impacts. However, this project, in conjunction with prior demonstration projects, is expected to result in long-term beneficial cumulative impacts on the environment by providing an environmentally sound means of managing dredged materials.

7. List of Agencies and Persons Consulted

Negib Harfouche, Ph.D., Principal Environmental Engineer (APC)
NJDEP, Bureau of Preconstruction Permits (BPP)
401 East State Street, 2nd Floor 2, P.O. Box 027
Trenton, NJ 08625-0027
(609) 292-2137

W. Scott Douglas, Dredging Program Manager
N.J. Department of Transportation, Office of Maritime Resources
1035 Parkway Avenue, 3rd Floor - MOB
P.O. Box 837
Trenton, NJ 08625
(609) 530-4773

Suzanne Dietrick, Chief,
Office of Dredging and Sediment Technology
N.J. Department of Environmental Protection
401 East State Street, P.O. Box 028
Trenton, NJ 08625
(609) 292-1250

Richard Tomer, Chief, Regulatory Branch
U.S. Army Corps of Engineers New York District
26 Federal Plaza
New York, NY 10027
(917) 790-8511

Marta Lefsky
Director of Planning
Woodbridge Township Planning Board
One Main Street
Woodbridge, NJ 07095
(732) 602-6029

8. Status of Permitting

Implementation of the proposed demonstration project requires the following five environmental permits:

Waterfront Development Permit: On November 4, 2004, Bayshore Recycling obtained a New Jersey Waterfront Development Permit Application for the placement and screening operations on the Temporary Dredged Material Storage and Handling Facility (ship) moored along the site waterfront in the Raritan River.

Acceptable Use Determination (AUD): An AUD from the State of New Jersey Department of Environmental Protection is needed for the beneficial use of treated sediment from the decontamination facility. The AUD application was submitted in July 2004, resubmitted (following comments from the NJDEP) in September 2004, and approved by the NJDEP on November 4, 2004.

Middlesex County Utilities Authority (MCUA) Wastewater Discharge Permit: BioGenesis has obtained a temporary discharge permit for the facility's wastewater. The permit application process was initiated in October 2004, and the temporary permit was issued in December 2005.

Air Discharge Permit: The NJDEP issued a temporary air discharge permit (NJID #18438 - EIP 04-001) for the project on September 19, 2005.

Sediment Storage Permit: Bayshore Recycling previously applied for and received permits from the NJDEP and the USACE for installation of a temporary dredged material storage and handling facility. The NJDEP's approval was issued on November 4, 2004, and the USACE's approval was issued on May 3, 2005.

9. Public Participation

Public outreach is an essential component of the USEPA Decontamination Program. Communities in the NY/NJ Harbor region are highly aware of the impact of activities that relate to municipal waste, sewage sludge, incineration, and topics of environmental concerns. The matter of dredged material is therefore one that needs to be explained in as much detail as possible to all the various stakeholders in the region. These stakeholders include local citizens, elected officials, federal, and state agency officials, technology development firms, university and other research scientists, and shipping interests.

In 1994, the Sediment Decontamination Citizens Advisory Committee (CAC) was set up to serve as one focal point in outreach activities. The CAC was assembled by EPA, USACE, and Brookhaven National Laboratory in conjunction with Rutgers University Institute of Coastal Marine Sciences to:

- Engage the public in a variety of forums to discuss the decontamination technologies;
- Identify and address key public concerns associated with sediment decontamination technologies and siting of future facilities; and,
- Provide outreach and access to information for citizens in the NY/NJ Harbor community.

BioGenesis has participated in the process and presented its bench and pilot-scale results at numerous CAC meetings. Several of these meetings have taken place in Newark, Harrison, Kearney, and Bayonne, New Jersey. Furthermore, EPA and the NJ Department of Transportation Office of Maritime Resources have presented numerous (over 30) program updates at regional meetings, workshops, and meetings with New Jersey and New York citizens advisory environmental groups. Meetings with local and environmental groups were also held regarding the construction and placement of the sediment holding facility in 2004 and 2005.